

What is claimed is:

1. A rotary actuator comprising:

a synchronous motor;

an internally meshing planetary reduction gear having a first shaft rotated by said synchronous motor;

an outer gear mounted to said first shaft with an eccentric part so as to be eccentrically rotatable around said first shaft;

an inner gear with which said outer gear meshes internally; and

a second shaft connected to said outer gear with transmission means that only transmits said outer gear rotation on its axis to said second shaft.

2. The rotary actuator according to claim 1, wherein said synchronous motor and said internally meshing planetary reduction gear are accommodated inside one housing, and said first shaft doubles as a rotor shaft of said synchronous motor.

3. The rotary actuator according to claim 1, further comprising:

an incremental encoder provided along said first shaft of said synchronous motor for detecting a rotation angle of a rotor of said synchronous motor in a rotating direction of said synchronous motor.

4. The rotary actuator according to claim 3, wherein

said incremental encoder further comprises:

a magnet that rotates integrally with said rotor and has multiple poles along a rotating direction;

magnetic flux detecting means fixed to the housing for detecting a change in magnetic flux when said magnet is rotated; and

said incremental encoder is an incremental encoder for detecting the rotation angle of the rotor through said magnetic flux detecting means by counting the number of repetitions of the change in the magnetic flux, which is induced by the rotation of the magnet.

5. The rotary actuator according to claim 4, wherein said synchronous motor is a switched reluctance motor.

6. The rotary actuator according to claim 1, further comprising:

output angle detecting means for detecting a rotation angle of said second shaft.

7. The rotary actuator according to claim 1, wherein the rotary actuator is mounted in a vehicle and is used as a servo mechanism for positioning purposes.

8. The rotary actuator according to claim 7, wherein said servo mechanism switches between a lock state and an unlock state of a parking lock device of the vehicle.

9. The rotary actuator according to claim 7, wherein said servo mechanism switches between shift range positions of a vehicular automatic transmission.

10. The rotary actuator according to claim 1, said transmission means further comprising:

a flange that rotates integrally with said second shaft, wherein said flange defines a plurality of inner pin holes formed on a circle on said flange; and

a plurality of inner pins fixed to said outer gear at a first pin end and loosely fitted in said inner pin holes.

11. The rotary actuator according to claim 1, wherein said outer gear defines a plurality of inner pin holes formed on a circle on said outer gear, and said transmission means comprises a plurality of inner pins fixed at one end to a flange that rotates integrally with said second shaft and that are loosely fitted in said inner pin holes.